

# An Explorative Study of Uncertain Specificities of Automation and Human Capital in Indian Perspective

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## *Abstract*

*An explorative study of uncertainty of automation and its probable impact on human capital is the main theme of this present paper. The research has been carried out with the help of secondary sources of data gathered on specific parameters considered under study, namely; (1) labour policies, (2) employment details of Indian economy, (3) economic disparities of Indian working population (GDP and Employment), (4) Foreign direct investments, and (5) data related to automation AI and robotics. It has been concluded in the research paper that automation is necessary in economy to progress but this automation should be in consideration of human capital aspects. The capacity of certain sector in terms of employability and potential value added should be in mind while designing long term policies in regards to the automation. The automation in this paper has been referring to the application of artificial intelligence and application of robotics in production processes. Ultimately, it has been intended that the outputs of the present study will play role of input in the future research.*

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## Introduction

Driven by the exponential growth in computing power and the digitization of things, artificial intelligence (AI) and robotics are poised to transform the economy. The human effortless mechanism is the result of AI and robotics setting up of new trend line in market and economy results into boosting productivity and generate significant wealth, while its potential impact on the labour market is concerning, with some estimates suggesting that nearly half of all existing jobs could be automated in the next two decades<sup>[1]</sup>.

It may not be perfectly true to estimate on these assumptions in relation with the Indian context as what is almost certain is that these technologies will further increase inequality among workers based on skills that are complementary to these new technologies (may be referred as automated human capital) and skills that are substitutes (may be referred as workforce). Former 'automated human capital' will be at demanding by industry whereas later 'workforce' will demand for basic rights to survive. The Indian labour policies will play critical role in upcoming future and will stand decisive to avoid this assumption to become specific. This may give birth to another category for reservation benefits in private sector.

With this intension present paper provides futuristic scenarios on the automation and human capital in Indian Context. In this view of matter, present paper has been presented with the help of six sections such as, **Section-(i)** starts with review of literature and provides conceptual base for the further research. In **Section-(ii)** problem statement of the present paper has been elaborated. Objectives of the study have been presented with the help of **Section-(iii)** of the present paper. **Section-(iv)** in this paper indicates methodological aspects of the research. Analysis of data has been presented in **Section-(v)**. Results and findings of the present study have been presented in **Section-(vi)**. Finally, scope and limitations of the study has been indicated in **Section-(vii)** and the research has been concluded with the help of **Section-(viii)**.

### Section-(i): Literature Review

Automation refers to the human efforts-less processes and activities. In simple fashion, activity which is achieved without interfere of human efforts is called as automation. This is mechanical task involving robotics and artificial intelligence. In the meaning of automation it is automatically visible that replacement of human efforts is essential to achieve automation. This has several features attached, such as, human efforts have limitations, such as, naturally, human beings require resting for a while but machines once automated may not require any kind of rest or refreshment. In industry, thus, demand for automated manufacturing devices are on rising side.

On the other hand, human capital is referred as, the stock of knowledge, habits, social and personality attributes, including creativity, embodied in the ability to perform labor, so as to produce economic value<sup>[2]</sup>. It is basically the capability of human being of particular nation. There is a difference between human being and human capital. The human being is much of natural phenomena having certain biological features but human capital is mostly economic term used to refer skills and ability of that particular human being. The capital of human being is much broader phenomena to the extent of particular nation. The person who is mentally challenged can be classified as human being but to include in terminology of human capital he must be an active participant of nation's economic activity<sup>[3]</sup>.

In broader sense, automation is in fact the conversion of human capital into idle human being. This is significant loss to the economy in which rising living standard is considered to be one of the indicators of human development and transforming human capital into idle man power can be a greater obstacle in this process.

Labour policies in this paper to the long term policies made by both the governments such as state government as well as central government. These policies have been identified with the help of legislation enacted in the India.

Gross domestic products (GDP) are the total production of the nation for certain period of time, frequently computed on the yearly basis. Foreign direct investments has been referred as, an investment made by a firm or individual in one country into business interests located in another country. Generally, FDI takes place when an investor establishes foreign business operations or acquires foreign business assets, including establishing ownership or controlling interest in a foreign company. Foreign direct investments are distinguished from portfolio investments in which an investor merely purchases equities of foreign-based companies<sup>[4]</sup>.

Automation is considered to be the process of mechanical activity carried by machines with no any direct involvement of human efforts. For the present study automation has been represented by two terms; Artificial intelligence I and robotics. At very outset artificial intelligence is defined as the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages. Further, the machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer is called as robot and the branch of technology that deals with the design, construction, operation, and application of robots<sup>[5]</sup>.

In the present study an effort has been made to explore possibilities of automation and its impact on human capital.

### **Section-(ii): Problem statement**

Automation in Indian economy is witnessing a huge developmental arena impacting on day to day life of civilization. The efficiency of economy is certainly on rise because of automation and robotics mostly in manufacturing sectors. This has slowly entering the other sectors as well. The primary example of this automation is automated ATM (kiosk) machines for receiving and paying hard cash available for 24 hours. The problem of this automation in banking sector is witnessing high level of un-employment. In simple words it may be said that, one ATM is in fact replacing one branch of bank that place. This signifies increased efficiency and growth of banking sector by losing at least two employment opportunities. Though, automation is not certain in nature but it is obvious thus impact of this automation may not be precisely estimated. Thus in the present study, exploration of this impact specifically on automation has been studied<sup>[6]</sup>.

### **Section-(iii): Objectives of the study**

The core objective of this study is to offer theoretical foundations for the futuristic specificities based on uncertain situations on the aspect of human capital and automation.

*The major objectives of the present study have been mentioned below-*

- To identify factors responsible for enhancing uncertainty in AI and Automation
- To formulate theoretical foundation on human capital in AI and automation environment
- To study Indian labour policies in the context of controversies estimated in futuristic labor issues

### Section-(iv): Methodology adopted in the research paper<sup>[7]</sup>

The present research analyses number of variables with the help of secondary data in Indian context such as, (1) labour policies, (2) employment details of Indian economy, (3) economic disparities of Indian working population (GDP and Employment), (4) Foreign direct investments, and (5) data related to automation AI and robotics.

All these variables are analyzed to enhance understanding of researcher on specificities of 'uncertain' variables studied for the present study. The study accommodates secondary sources of data such as articles and research works carried out on AI, robotics etc. These secondary sources of information have been provided theoretical base for the present study. Both the data sources have been utilized to prepare premises of prediction for the study.

It also need to be mentioned here that, present study is the exploratory study and intended to provide different scenarios of Indian economy in general way and Indian Labour Economy in specific manner. Entire research work can be treated as desk review of various policy documents and estimates made on technological advancements. The research further theoretically correlates all these reviews and estimated with the Indian labour mechanisms to portray specificity among uncertainties to human capital. The entire research has been based on the assumed premises that technology adoption is required large scale of capital resources in both ways such as, general capital and human capital<sup>[8]</sup>.

The major challenge of this study has been heavily resting on the mentality of industries of treating human capital as expenditure and lack of frame work available in financial reporting.

### Section-(v): Data Analysis and interpretation

The extent and speed of the transformation remains uncertain. This statement need to be considered with the Indian context as Indian economy is surprisingly driven by labour orientation but leaded by capitalization. This controversial argument is witnessing contradiction of labour policies and industrial incentives offered by the Indian government. Another possible specificity in this context is discrimination based on the sectoral policies to accommodate both the 'automated human capital' and 'workforce'. Possibly, automated human capital will be absorbed by the primary producing sectors which give lowest return on employment but ready to invest heavily in employing hi-technologies. Secondary sector may show certainties of absorbing both categories and will stand decisive in attaining equilibrium on the context of demanding nature of basic aspects as mentioned earlier. The tertiary sector will provide highest employment of 'workforce' resulting in challenges in managing humanity factors. The fourth sector may arise with dynamic uncertainties that may absorb both workforce categories and may evolve another categories but core of this sector will be to provide resources to all other sectors for technology as well as human resources<sup>[9]</sup>.

Another dilemma of this futuristic discussion will lead to attaining equilibrium on the part of Indian policies; in such a manner technological environment in India on R & D activities is always ascertained on the possibilities of generating employment in quantitative nature. This dimension of resource allocation to Research and Development activities is witnessed on the project those leads automation. Indian policies are yet not favorable in spending so much on automation but the entire world in on cutting edge of innovative development. This has kept no way for Indian policy makers to provide incentives on developing new technologies irrespective of its potential of employment generation<sup>[10]</sup>.

In the sphere of *labour policies*, in India to the extent of automation, it has to be pointed out that the framework of labour legislation is seem to be much complicated in terms

of compliances required under various labour laws in India. This leads to the general behavior of skipping huge employment and deciding on heavy capital investment in automation. Secondly, labour laws in India are more of the labour centric than employer centric. It is wisely said regarding labour legislation; that hiring employees in India is easy but separating the employee is difficult. This aspect also leads to the more investment in automation. In the manufacturing industry most of the discrimination has been observed on basis of gender. The women workers mostly employed in the jobs that required repetitive nature of human efforts. This kind of work is comparatively more prone to be automated. This has severe impact on the reduction of employment of the women. Further there less wages paid to the women for similar work carried out in India, though this discrimination cannot be judged as women themselves are ready to work in minimal wages. The management call this as wage bargaining<sup>[11]</sup>.

Third aspect of labour policy is said to be manufacturing sector oriented. This is again true that in India most labour legislations are formed keeping in mind the manufacturing sector. This leads to the negligence towards services sector which contribute 53 per cent to the Indian GDP. Thus on the aspect of automation, manufacturing sector is more prone to be automated than service sector<sup>[12]</sup>.

Apart from this legal framework, *employment* details of Indian economy also need to be investigated to arrive at the solid conclusion of the present study. Based on the data presented in the below table, it would be seen that the rate of change in employment in agriculture is witnessing the change in gross value added as compared to the services sector<sup>[13]</sup>.

**Table 1.1: Employment in Various Sectors and Gross Value Added**

Sectors	Shares			
	1999-2000		2009-10	
	Employment	Gross Value Added (GVA)	Employment	GVA
Agriculture	59.9	23.8	53.2	14.6
Manufacturing	11.1	15.5	11.03	15.9
Non-manufacturing	5.3	11.8	10.49	12.2
Services	23.7	48.9	25.28	57.3
Total	100	100	100.0	100

Source: CSO, and NSS Employment and Unemployment Surveys, various rounds.

Briefly speaking, agriculture sector is largest employment provider in the country but it creates comparatively less value addition in GDP. This leads to the contradictory situation such as if automation has been proposed in the agriculture sector large number of un-employment may witnessed. But productivity of the agriculture sector is also need to be enhanced. Further labour is the only factor of production that can be manipulated to achieve efficiency in agriculture sector. This is the reason that automation is required in the agriculture sector to enhance Gross Value Added. Second aspect of this data revealed that major automation has been witnessed in the manufacturing sector but though this automation manufacturing sector does not have changed its employability which remained same and constant across the years studied in the above table. This case of manufacturing needs to be referred for the implementation of automation in agriculture sector<sup>[14]</sup>.

The Table No. 1.2 provides details on the number of employees employed in the various sectors. It has been seen from the below table that, agriculture sector is employing largest number of workers but it has not sable as much of variations have been observed in the number of workers employed in agriculture sector. The reason for this may be attributed to the lack of legislation in this sector. The employment in this sector is again of informal category. Thus absence of formal relation between employer and employee gives flexibility

for achieving required number of employment. This is in fact healthy sign of attracting automation in the agriculture sector. Only policy needs to be detailed for absorbing existing working population in the automated industry.

Further in the manufacturing sector and service sector, employment is observed to be on constant rising side. Also the proportion of workers in total workforce is also increasing. This need not be disturbed because of the automation. The progressive nature of the manufacturing and service sector in terms of employment generation is may be attributed to the FDIs coming in this sector.

**Table No. 1.2: Number of workers in various sectors**

Sectors	Number of workers (in millions and %)				
	1993-94	1999-2000	2004-05	2009-10	2011-12
<b>Agriculture</b>	<b>241.5</b>	<b>246.6</b>	<b>268.6</b>	<b>244.9</b>	<b>231.9</b>
<b>% of total</b>	<b>64.6</b>	<b>61.7</b>	<b>58.5</b>	<b>53.2</b>	<b>48.9</b>
Manufacturing	38.9	42.8	53.9	50.7	59.8
<b>% of total</b>	<b>10.4</b>	<b>10.7</b>	<b>11.7</b>	<b>11.0</b>	<b>12.6</b>
Other industries	15.8	20.4	29.4	48.3	55.3
Services	77.7	89.8	107.3	116.3	127.3
<b>% of total</b>	<b>20.8</b>	<b>22.5</b>	<b>23.4</b>	<b>25.3</b>	<b>26.8</b>
Total	374.0	399.5	459.1	460.2	474.2

The employment status of India is important to the extent of generating livelihoods. This aspect can be stressed on the grounds of *economic disparities* in the working population. From the **Table No. 1.3** below, it would be seen that, lowest average monthly wages of the Indian workers are Rs. 10,000 and for skilled workers it is Rs. 43,000. This is disparity in the wage earning of the Indian workers. Now with reference to the automation these disparities are expected to grow time to time.

**Table No. 1.3: Employment Status in India**

India Labour	Last	Previous	Highest	Lowest	Unit
Unemployment Rate	3.52	3.51	8.30	3.41	Percent
Employed Persons	29650.00	28999.00	29650.00	17491.00	Thousand
Unemployed Persons	44.85	48.26	48.26	5.10	Million
Labor Force Participation Rate	52.50	50.90	52.90	50.90	percent
Population	1283.60	1268.96	1283.60	359.00	Million
Retirement Age Women	60.00	60.00	60.00	60.00	
Retirement Age Men	60.00	60.00	60.00	60.00	
Living Wage Family	19400.00	19200.00	19400.00	19200.00	INR/Month
Living Wage Individual	10300.00	10100.00	10300.00	10100.00	INR/Month
Wages	272.19	255.65	272.19	3.87	INR/Day
Wages High Skilled	43200.00	46200.00	47300.00	43200.00	INR/Month
Wages In Manufacturing	347.30	322.07	347.30	4.86	INR/Day
Wages Low Skilled	10900.00	11300.00	13500.00	10900.00	INR/Month
Youth Unemployment Rate	12.90	18.10	18.10	12.90	percent

(Source: <https://tradingeconomics.com/india/wages>)<sup>[15]</sup>

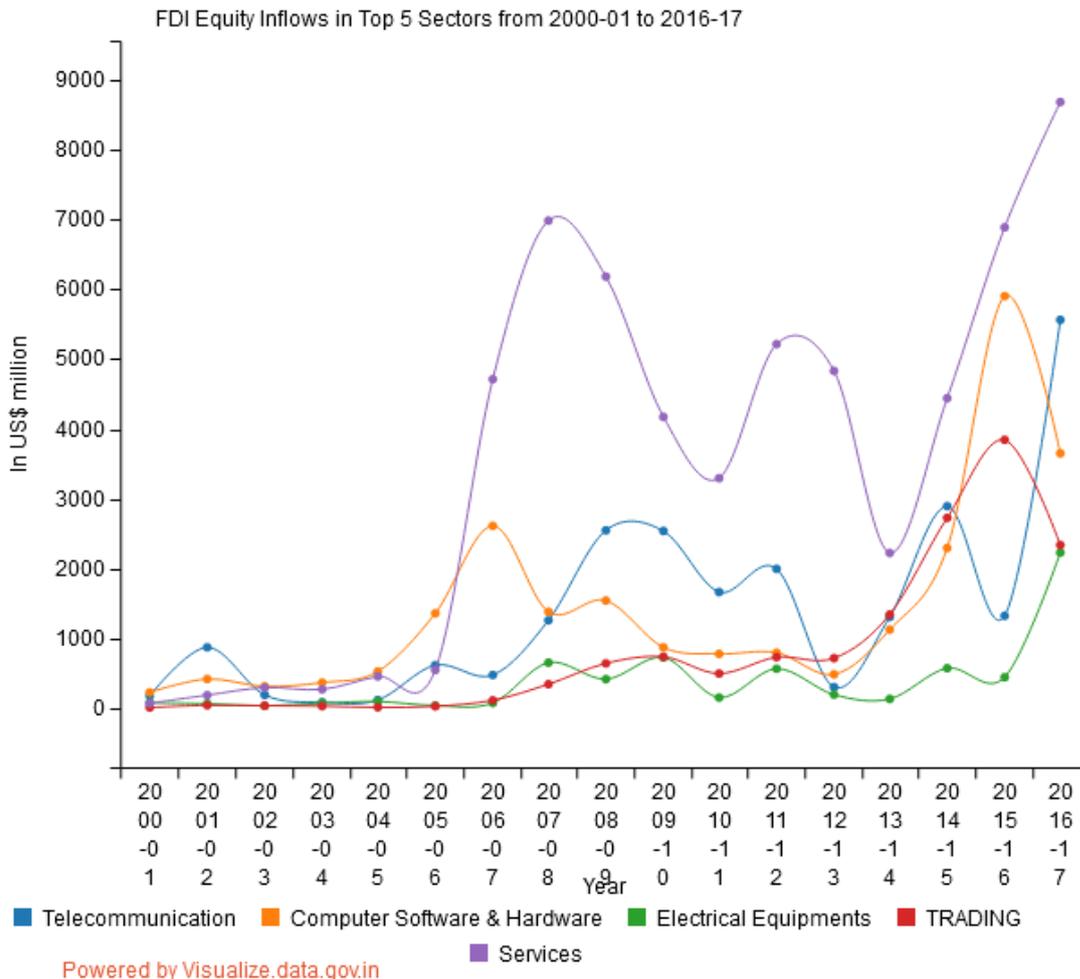
Further, the table explicitly state that, unemployment in youth is more than general unemployment rate. The lower scale of wage rate with huge disparities is likely to be contradictory with general theory of automation. It is very simple logic that, in a country where labour is waged high naturally needs to prefer more automation in processes. In economic sense, larger the demand for labor, compensates equal demand for automation. This, simply articulate the fact that higher demand for labour will remunerate them competitively and that again will be more than *just* living wage. In this scenario mostly in developed countries, automation will be a welcoming aspect of the economy, but considering the situation of Indian labour market and the un-employment ratio, automation certainly not the equation to be proposed. As low demand for employment due to lack of employable skills will be certainly hampered by automation. The wage differentiation is may stretched because of automation.

Another factor under consideration for the present explorative study is *foreign direct investment (FDI)*. Automation in India is sharply connected with the FDIs coming. The reason behind this is investment made by investors or countries from developed era are interesting to adopt their state of the art manufacturing facility or insist on process that they are adopting. To cater or this situation labour also need to be up scaled to match the requirements of international working standards. This situation again required sharp attraction towards policy implications of the situation. As per the theory of investment multiplier external injecting investment are required to rotate the economy on positive front to witness growth in upcoming time period. But in case of India, FDI have pulled demand for skilled workers that could not be catered to this state of the art processes<sup>[16]</sup>.

The *Figure 1.1* shows inflow of FDI in terms of equity according to top five sectors. As stated earlier, FDIs have attracted more equity in service sector. The data used in the figure relates to Year 2000-2001 to 2016-2017. There are more fluctuations witnessed in the service sector but after year 2013 FDI is upward sloping. Only electrical equipment manufacturing sector has been observed slower but study growth in terms of attracting FDIs. From the year 2000-01 to 2005-06, the FDIs in all sectors are not significantly varied. The rapid variation in FDIs has been found later in the Year 2005-06 to 2016-17 and it is continuing. Now, in relation to the automation of and human capital of India it is been supportive to the earlier observation made in above sections. The steady inflow of FDI provides policy freedom to absorb shocks to the extent human capital.

Steady inflow of FDI will assist in estimating FDIs and future trends in human capitals requirements. The skills that are required and the strategic ways to accomplish it can be stressed. But in case of Indian data for FDIs there is no any particular sector showing linear trend that could assist in estimating futuristic scenarios.

Figure 1.1 – FDI Equity Inflows in Top 5 Sectors from 2000-01 to 2016-17



Another way of studying automation and human capital aspects in Indian Economic sphere is consideration of the two dimensions of automations namely, application of Artificial Intelligence and Robotics in the various processes of business. The Government of India has recently undertaken several initiatives to pave the way for AI-led economic transformation in India. While these initiatives have been at a strategic level—focusing on 5–10 year plans for increasing research and development as well as commercial uptake of AI-powered solutions—future initiatives are expected to take on a more operational approach with specific incentives aimed at facilitating the integration of smart solutions within sectors and functions.

In terms of providing financial support for AI programmes, the Ministry of Electronics and Information Technology, Government of India, has been funding projects by educational institutions in the areas of ubiquitous computing and wireless sensor networks for real-time landslide monitoring and perception engineering. Further, there is potential for companies to set up AI-focused innovation centres in India with government encouragement through initiatives such as Digital India and Make in India, which have created a favorable regulatory environment. More than **36%** of large financial establishments have already invested in these technologies and around **70%** plan to embrace it in the near future. This is significant aspect of automation in terms of AI and robotics application in business. It has created some sort of problems in human capital arrangement. Automation seem to be good preposition to the efficient productions but at the same time it is replacing human efforts in process. Ultimately speaking replacing of the human factor in production certainly affects the circular flow of economic activity. The distribution of economic growth may not be equated

into four factors of productions. As such the wages paid to labour soon will be allocated to the capital that invested into intensive automation in businesses.

The survey sought to understand existing perceptions of the impact of AI and robotics on broad social and economic causes as well as AI-enabled service delivery. The results showed an overwhelmingly optimistic view on the impact of AI, with over **71%** of the participants believing that AI will help humans solve complex problems and live more enriched lives. **58–74%** of the participants indicated a positive outlook on the likelihood that AI will aid socioeconomic causes like economic growth, health and well-being, education, cyber security and privacy, and that the government would take steps towards their application for the same. Apart from this reskilling is necessary when it comes to implementing artificial intelligence.

### **Section-(vi): Results and Findings**

The finding of the present research can be summarized as, application of automation and robotics is essential in growing economy to enhance efficiency, though consideration of the economy at a whole cannot be neglected. It has been found that service sector has been growing rapidly in India also it has been attracting more FDIs. Now it is the time to consider policy against application of automation in this sector as it is highly potential sector in current scenario in terms of providing employment.

Ultimately results of this paper have been mentioned under every parameter analyzed in this research. Considering the over dynamic nature of automation and robotics condition of human cannot be estimated on significant level of confidence. Though, it is more essential to understand dynamic nature of this problem so that it can be taken care at the time of offering long term policies.

### **Section-(vii): Scope and Limitations of the Study**

First limitation of the study rest in its title; as it has been mentioned explorative nature of its methodological aspect. Explorative nature of investigation has its own limitations to which limit the interpretation of the study as compared to empirical investigation.

The study further limits its scope only to select parameters such as, (1) labour policies, (2) employment details of Indian economy, (3) economic disparities of Indian working population (GDP and Employment), (4) Foreign direct investments, and (5) data related to automation AI and robotics.

In regards to the time frame, study uses data from F.Y 2000-2001 onwards and the conclusions that have been drawn from the investigation of the data reflects the scenario of further 15 to 20 years.

### **Section-(viii): Conclusion**

It has to be suggested on the grounds of exploration made in the above sections that, heavy taxes should be levied on the automated sectors. The capital that invested for automation must be taxed heavily also higher import duty should be levied on imports of automated machines. All these taxes so collected should be spend on up-skilling of workers of same industry from which tax has been collected. This tax may be of surcharge or kind of additional cess.

According to the objectives mentioned above the present research can be concluded as:

- There are tremendous factors responsible for enhancing uncertainty in AI and Automation. Though most importantly, these factors can be classified into two brief categories such as, factors responsible directly and the factors those are indirectly impacting uncertainties. The direct factors are, innovation in the sector, demand for technology, funding available for research in automation. The indirect factors are government policies, culture, and employment status in the economy and technology spillovers.
- To formulate theoretically speaking human capital just a concept raised in developing countries but has not practiced in Indian context. The automation is much used and applied in India. This the controversial issue that in India without understanding human potential in terms of human capital policies have framed to replacing it by automation.
- Because of automation very few workers will remain in industry but possess very high level skills and will be financially stable. Increasing demand for their skills will keep them in confidence. This will indicate the potential strength of workers in bargaining. There may be absence of industrial unrest or it may be at the peak point ever.

Ultimately, it has been intended that the outputs of the present study will play role of input in the future research.

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